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# **Emerging WMD threats and the Proliferation of WMD material: NM Perspectives**

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## National Preparedness

*Intelligence: Collection, Dissemination, Integration, Analysis and Action*

### *Preparedness*

**Prevention**

**Protection**

**Mitigation**

**Response\***

**Recovery**

Policy & Planning

Training/Exercises

Countermeasures

Intelligence

Assessment

Tiered Deployment

NCB/NM Efforts (Deterrence, Physical Security, International Engagements, Technical Capabilities)

DoD Efforts (Planning, Programs, Policy, Operations)

Interagency/National Effort (Joint TF, Regional, Multi-jurisdictional)

\* Response is both following an incident or response to information leading to interdiction

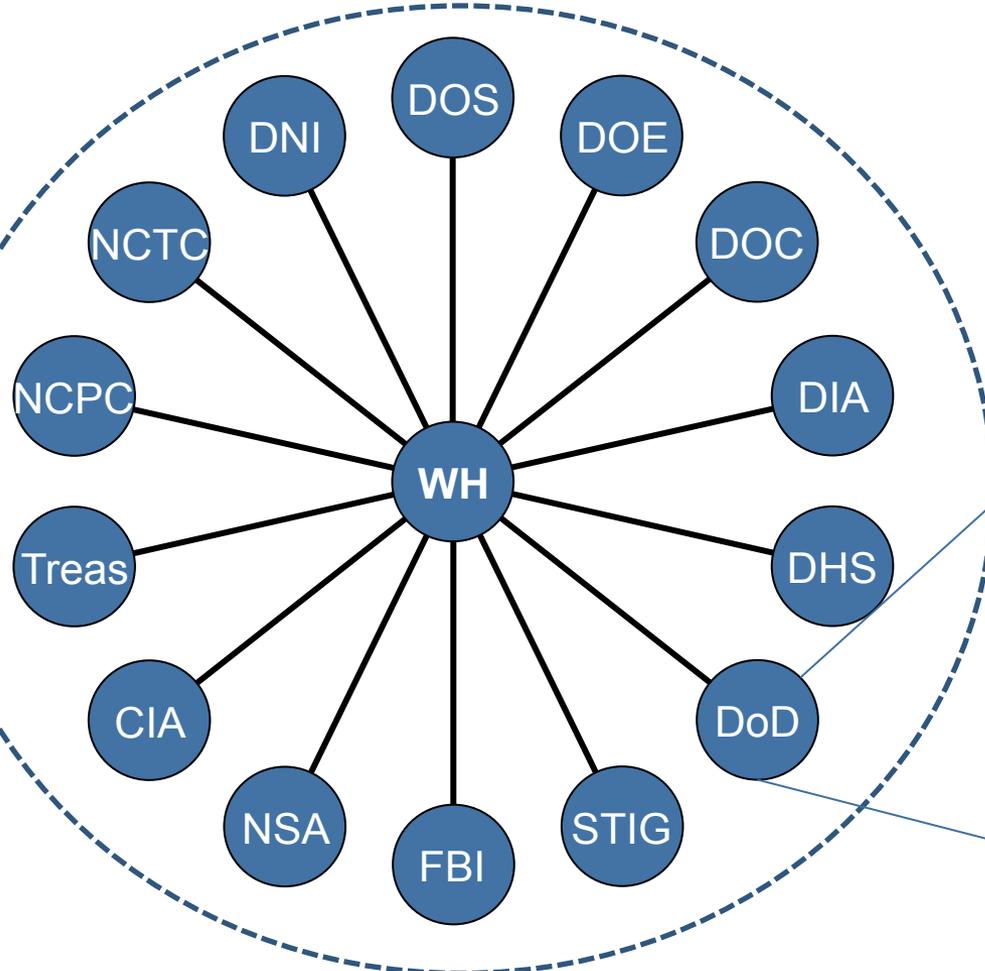


# Does Industry Have A Role?

- Infrastructure & Vulnerability
  - Electrical Grid
  - Internet
- Subject Matter Expertise
  - Cyber, Physical Sciences, Manufacturing
- Material Source
  - Chem, Bio, Rad, Energetic Material
- Unique Response Capabilities
  - Deep Water Horizon (BP)



# USG CWMD Team Construct



- IAEA
- INTERPOL
- UN 1540
- GICNT
- Global Partnership
- Nuclear Summit
- WINS
- Bi-Lateral
- Multi-Lateral

- OSD
- CCMDs
- Joint Staff
- Services
- DTRA/CCWMD
- Defense Agencies

Commerce, DOD, DOE, DOS, FBI, Treasury

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DOD, DHS, FBI

DOD, DOE, DOS

Intelligence

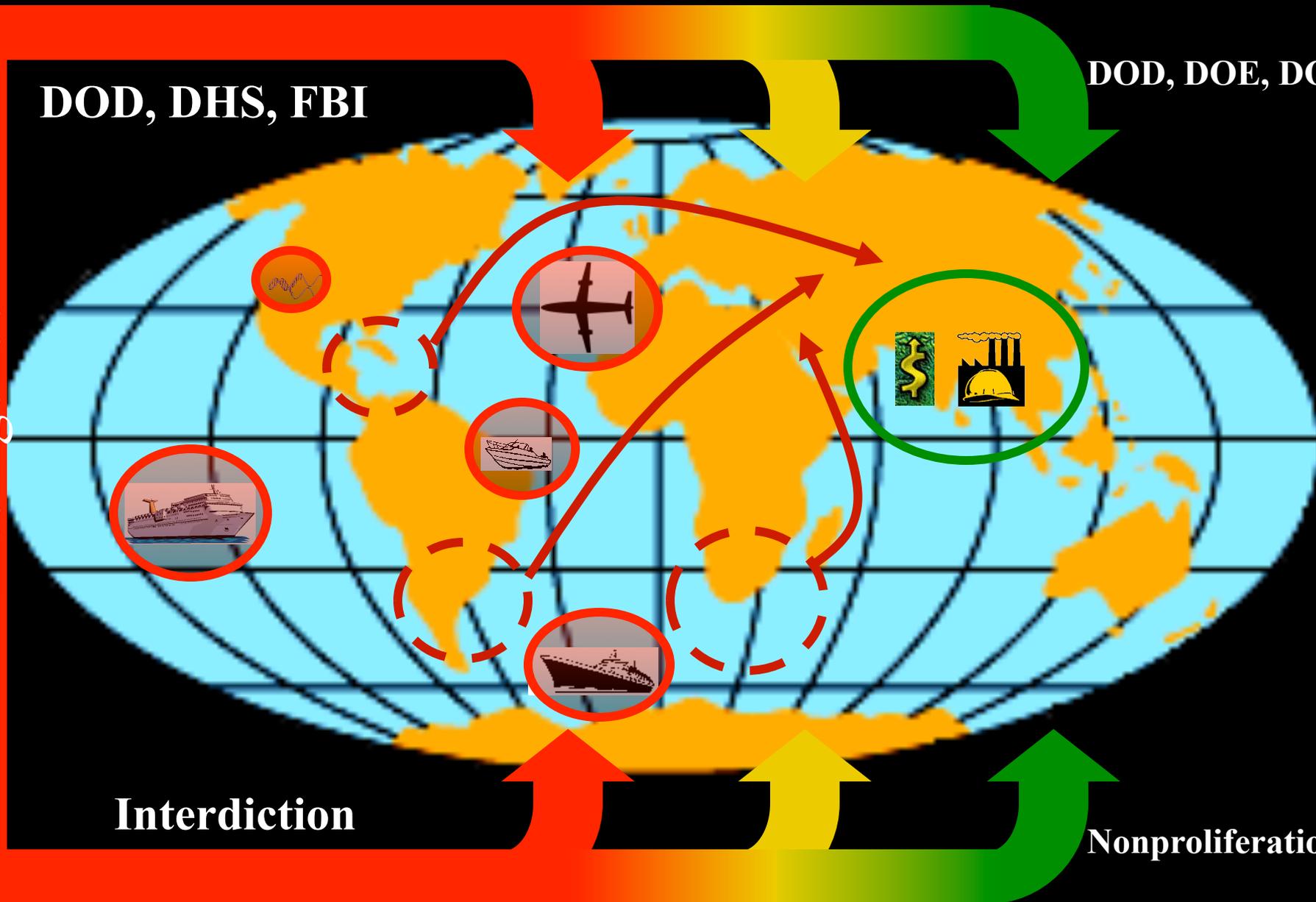
International Partners

Interdiction

Nonproliferation

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Counterproliferation



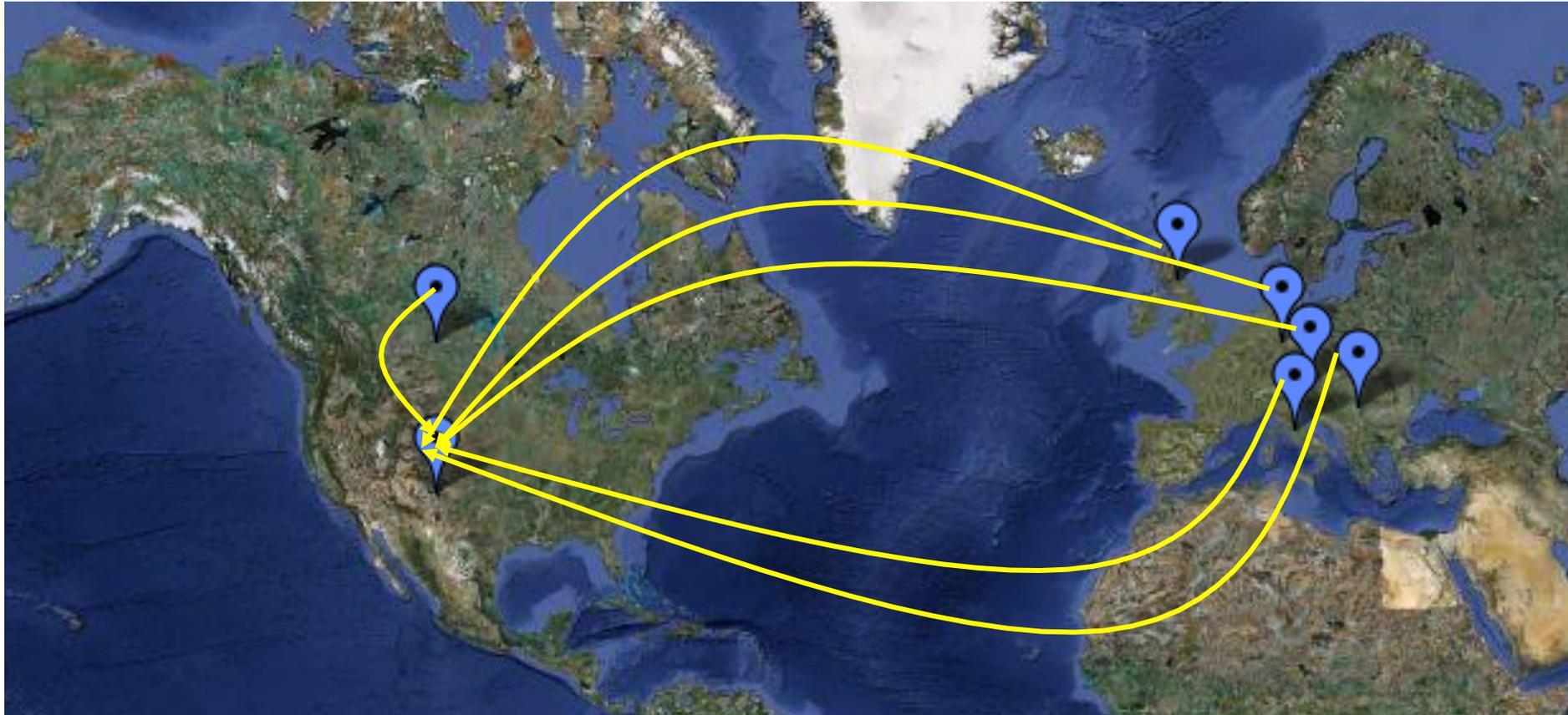


# CP Discussion

- Historical Perspective
- Case Study
- Counterproliferation Programs
- Attribution Process
- Community Partnership

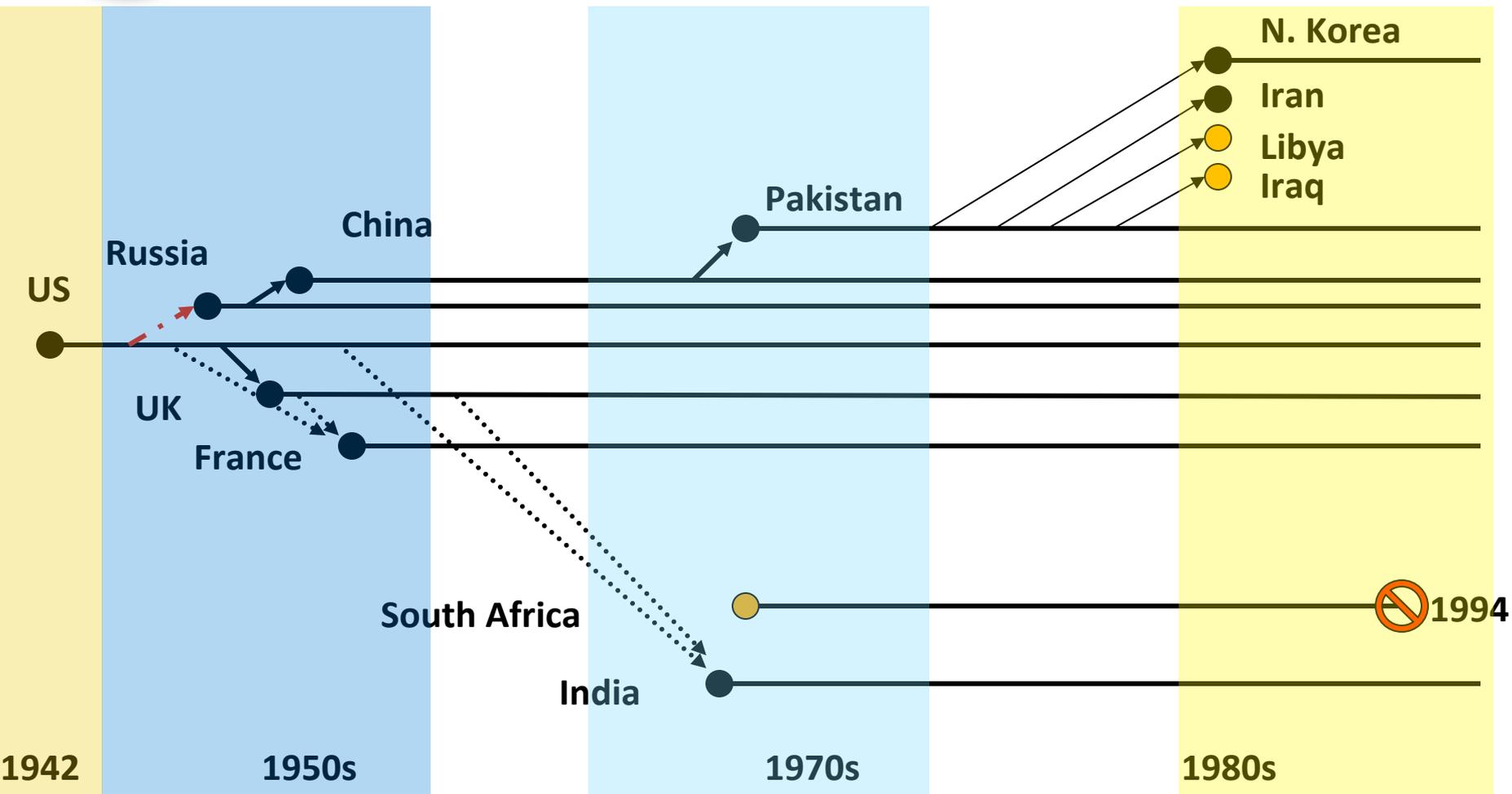


# Manhattan Project





# Nuclear Programs





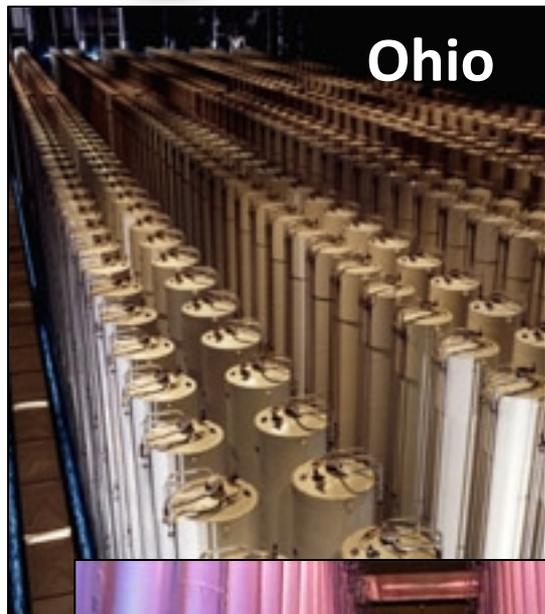
# Proliferation Examples

- Industrial Nexus
  - Intentional
  - Unintentional



# Proliferation Examples

Ohio



Libya



Russia



Netherlands:  
Urenco

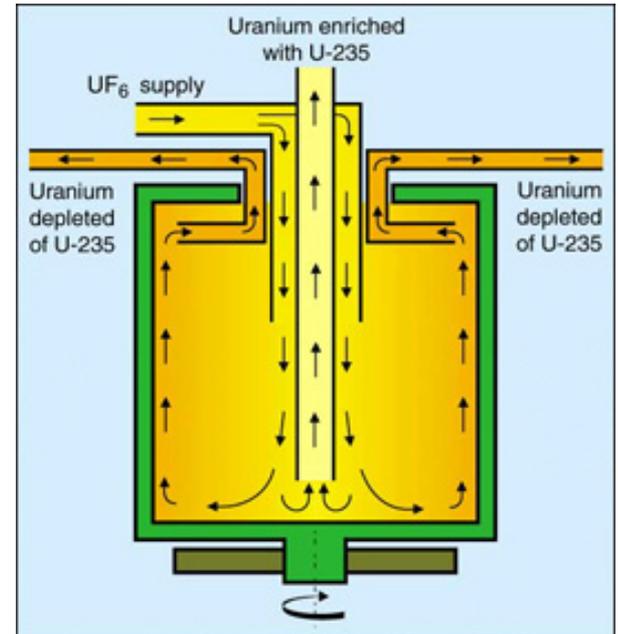


Iran





# Dr. Gernot Zippe (1917-2008)



Invented the Zippe-Type centrifuge: The easiest way to make fuel for reactors and weapons.



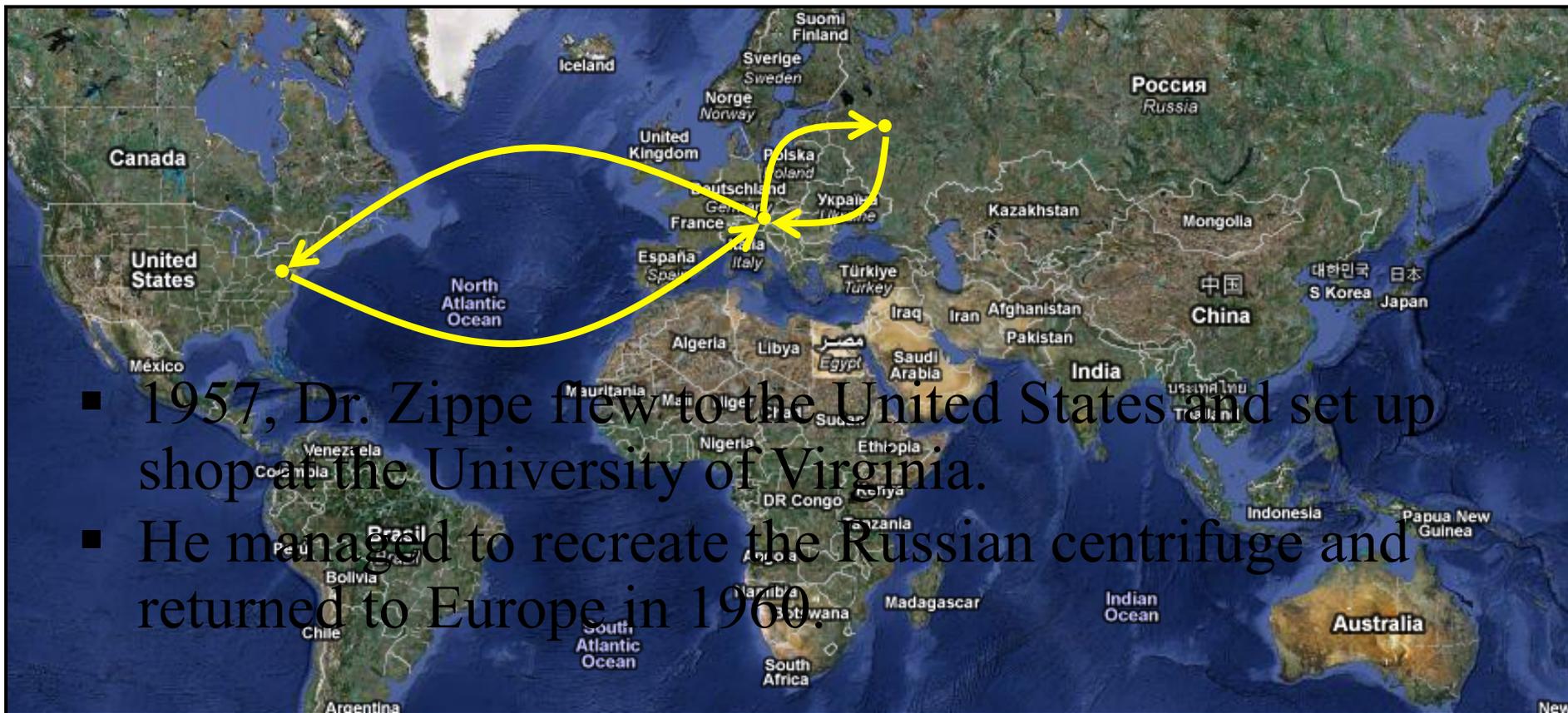
# Dr. Gernot Zippe

- Born and raised in Austria
- In 1945 he was kidnapped and held prisoner in the Soviet Union where he was ordered to develop a centrifuge program.
- Having done as he was asked, he was freed by the Soviets (1957)!





# Dr. Gernot Zippe



- 1957, Dr. Zippe flew to the United States and set up shop at the University of Virginia.
- He managed to recreate the Russian centrifuge and returned to Europe in 1960.



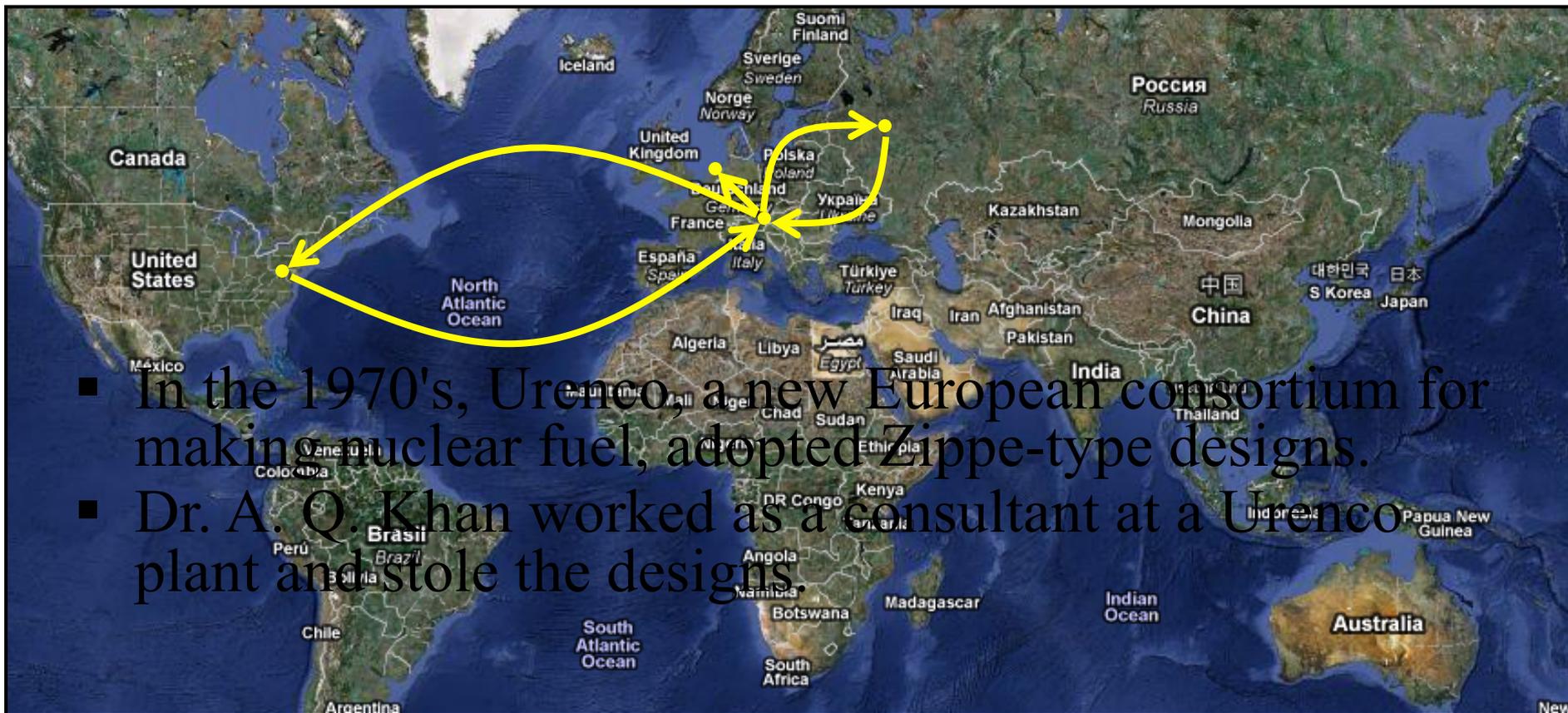
# Dr. Gernot Zippe



- In the 1960s, Dr. Zippe switched the rotor material from aluminum to maraging steel to allow for higher spin rates.
- Rotors were made longer, which increased the collection of U-235.



# Dr. Gernot Zippe



- In the 1970's, Urenco, a new European consortium for making nuclear fuel, adopted Zippe-type designs.
- Dr. A. Q. Khan worked as a consultant at a Urenco plant and stole the designs.





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# UNCLASSIFIED Iraq Insurgents Employ Chlorine in Bomb Attacks: February 22, 2007





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# Gang Arrested Trying to Sell Enriched Uranium: November 29, 2007



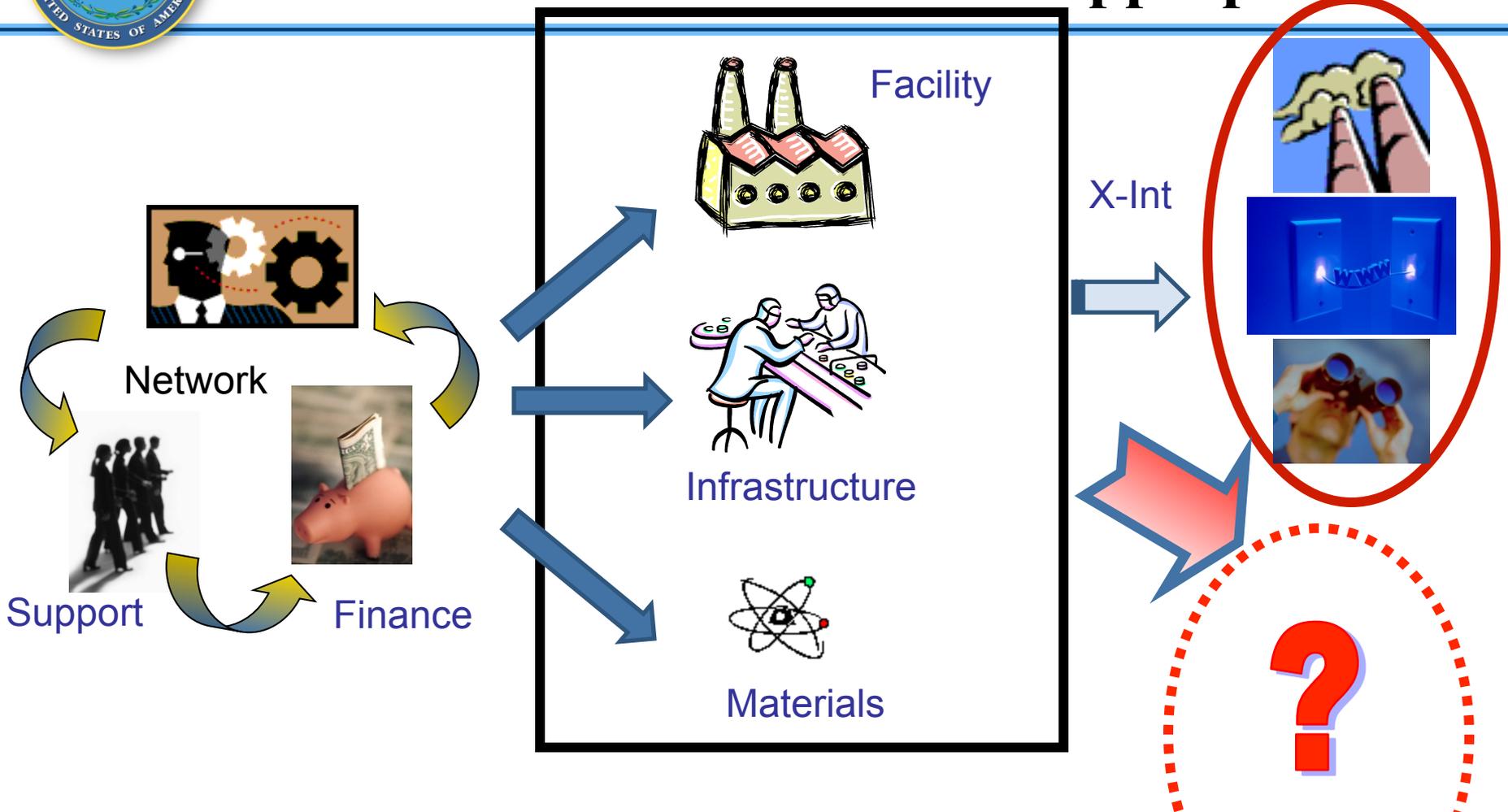
Two Hungarians and a Ukrainian man were arrested by the Slovakian police as they tried to sell the uranium.





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# Preventing WMD Material Misappropriation



<b><i>Preparedness</i></b>				
<b>Prevention</b>	<b>Protection</b>	<b>Mitigation</b>	<b>Response*</b>	<b>Recovery</b>
<b>Policy &amp; Planning</b>	<b>Training/Exercises</b>	<b>Countermeasures</b>	<b>Assessment</b>	<b>Tiered Deployment</b>



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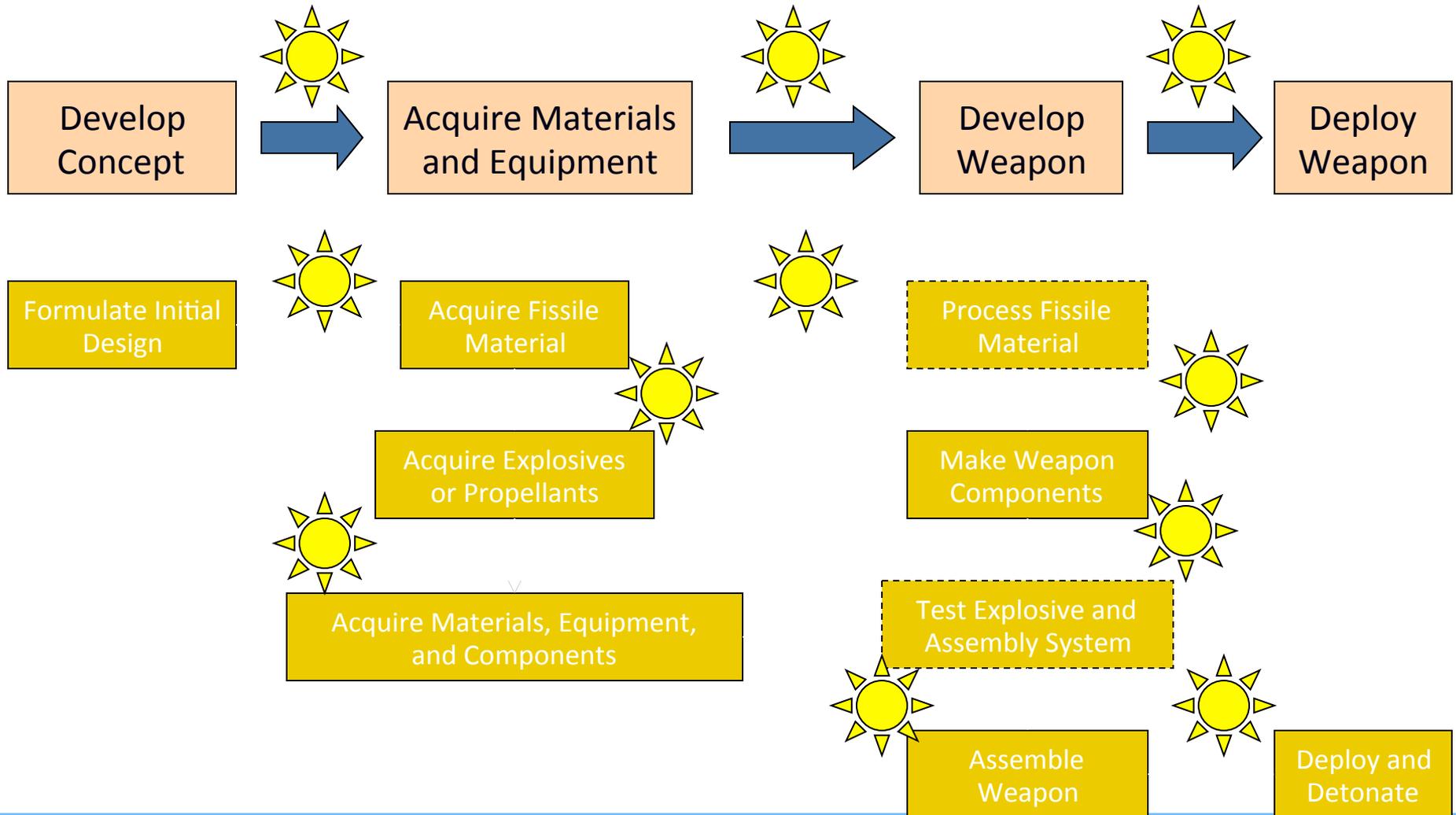
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# WMD Proliferation

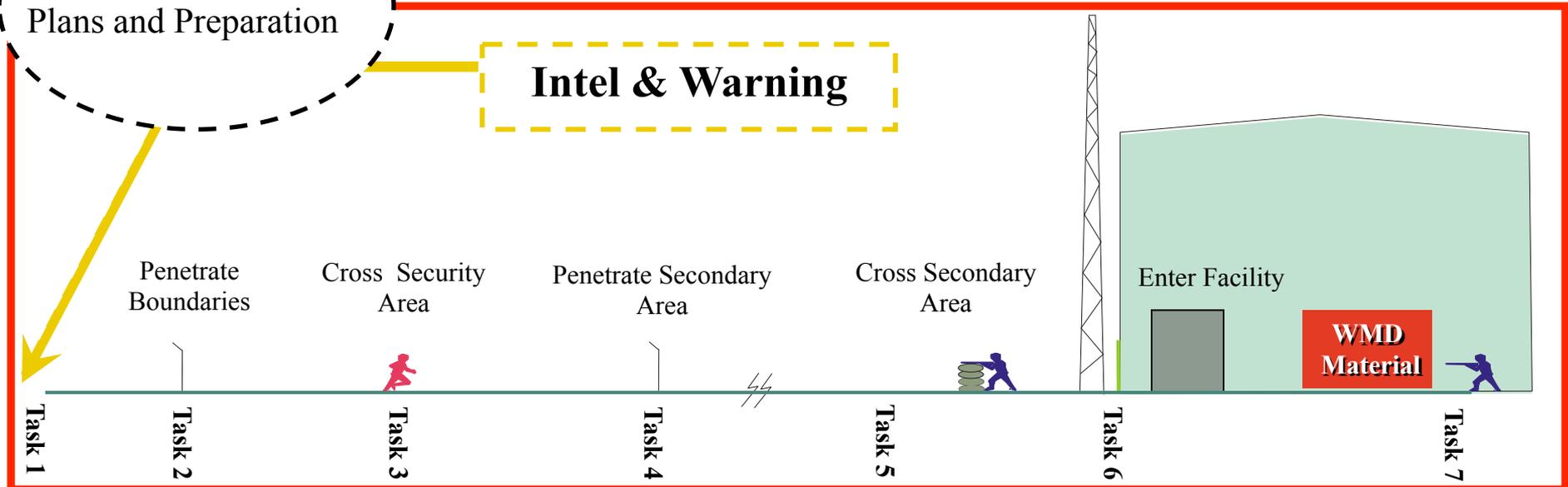


# The 5 Ds of CWMD Physical Security



Adversary Surveillance,  
Plans and Preparation

Intel & Warning



Deter

Detect

Delay

Deny

Defeat

***We only have to be successful once; the adversary has to be successful at every point.***

Preparedness

Prevention

Protection

Mitigation

Response\*

Recovery

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# UNCLASSIFIED Preparedness – Monitoring and Verification

## Radiological Detection System (RDS)

- Detect, classify, and measure radioactive materials
  - Replaces legacy RADIAC meters
  - Sensitivity covers operational and occupational levels and quantities
- Network interoperability
  - Geographic location data enabled
  - Autonomous and on-demand data entries, network, and information exchange
- Procurement planned for USA, USAF, USMC, USN



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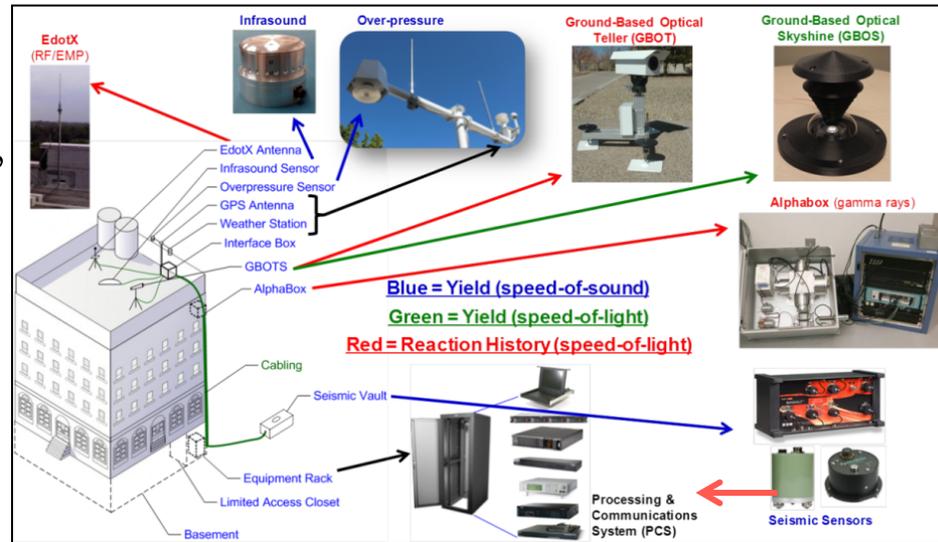
Tiered Deployment



# UNCLASSIFIED Preparedness – When has something happened?

## PROJECT DISCREET OCULUS

- Prompt diagnostics research & development project by the Defense Threat Reduction Agency.
- Ground-based sensor suite collects prompt outputs of a limited nuclear event in an urban environment.
  - Measured outputs include seismic, infrasound, overpressure, electromagnetic pulse, gamma radiation, and optical signatures.
  - Sensor readings sent to the Air Force Technical Applications Center for analysis and reporting.



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# Preparedness – Detecting What Happened

## Harvester Particulate Airborne Collection System (PACS)

- Modular air sampling capability tested on C-130 and MQ-9 aircraft.
- Post-collection analysis: samples prepared in a deployable clean room, radio-chemical analyses conducted at a lab.



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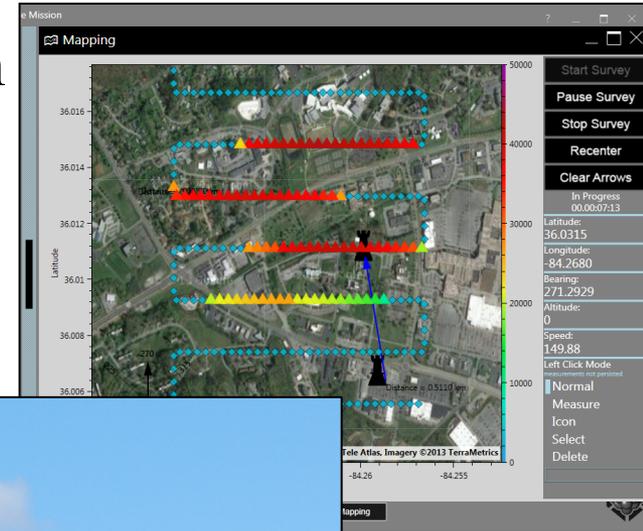
Tiered Deployment



# Response – Use of WMD Materials

## Airborne Radiation Detection & Identification Measurement System (ARDIMS)

- Wide-area radiological reconnaissance mapping capability to support ground collection.
- Gamma and neutron detection pods mounted on UH-60 displays real-time gross count and dose rate and radiation mapping to inform collections.



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# Response – Material Collection and Analysis

## Ground Collections Task Force

- Collect radioactive debris samples quickly and process, prepare, and package the evidence for transport to national laboratories.



### Equipment

- Mojave suits, boots, booties, gloves, M40 protective masks
- Ion chamber gamma detectors
- AN/UDR-14 dosimeters
- Humvee, GPS/maps, satellite phone
- Collection kits, marking kits

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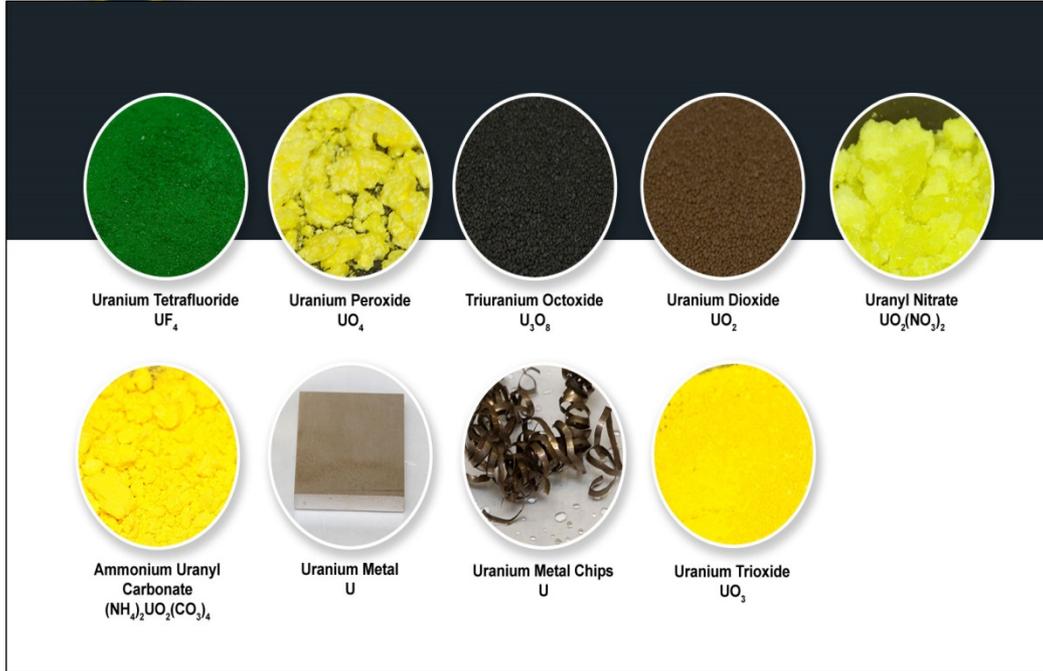
Intelligence

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# Nuclear Deterrent Preparedness



Material



Weapon

***Preparedness***

***Prevention***

***Protection***

***Mitigation***

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Commerce, DOD, DOE, DOS, FBI, Treasury

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DOD, DHS, FBI

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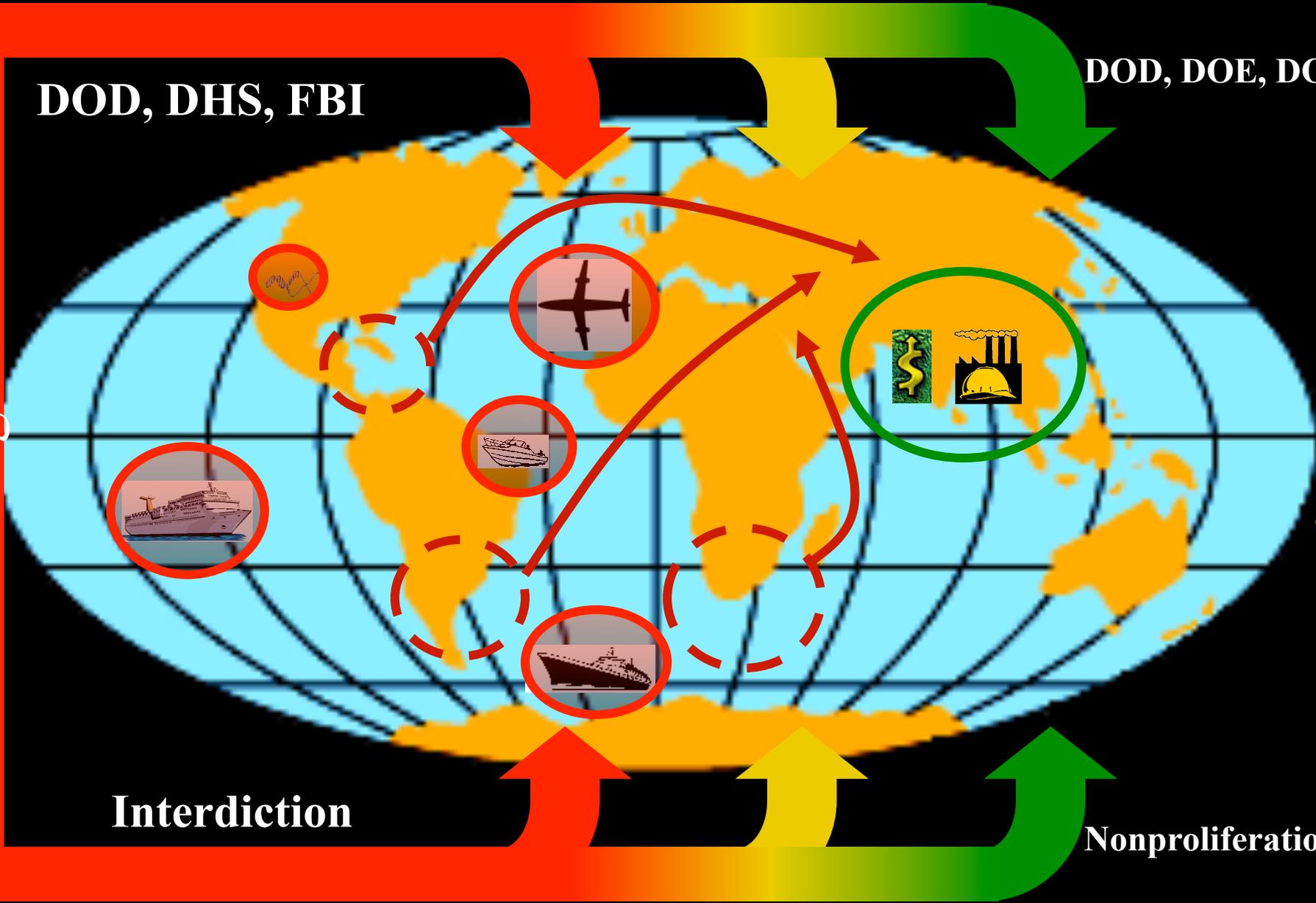
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# UNCLASSIFIED U.S. Response: Scale and Persistence Drives Lead

## FBI

Mumbai/T ('08)



## DOD

Syria/Chem ('14)



Syrian Chemical Weapons facilities mapped by Monterey Institute of International Studies (USA)

Spain/E ('04)



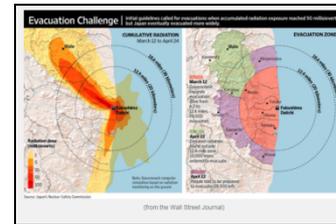
600 Sapphire /Nuke ('94)



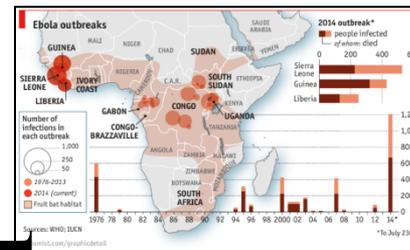
UK/Rad ('06)



Fukushima/RAD ('11)



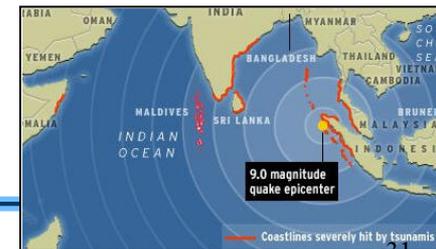
W-Africa/Ebola ('14)



Tbilisi/HEU ('06 & 09)



Phuket-hurricane ('04)



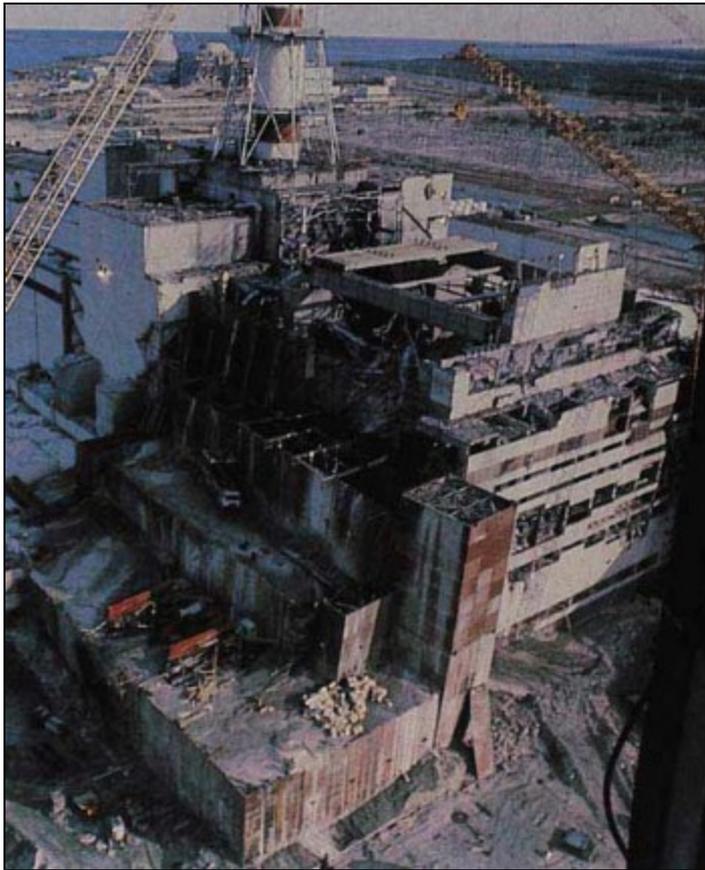
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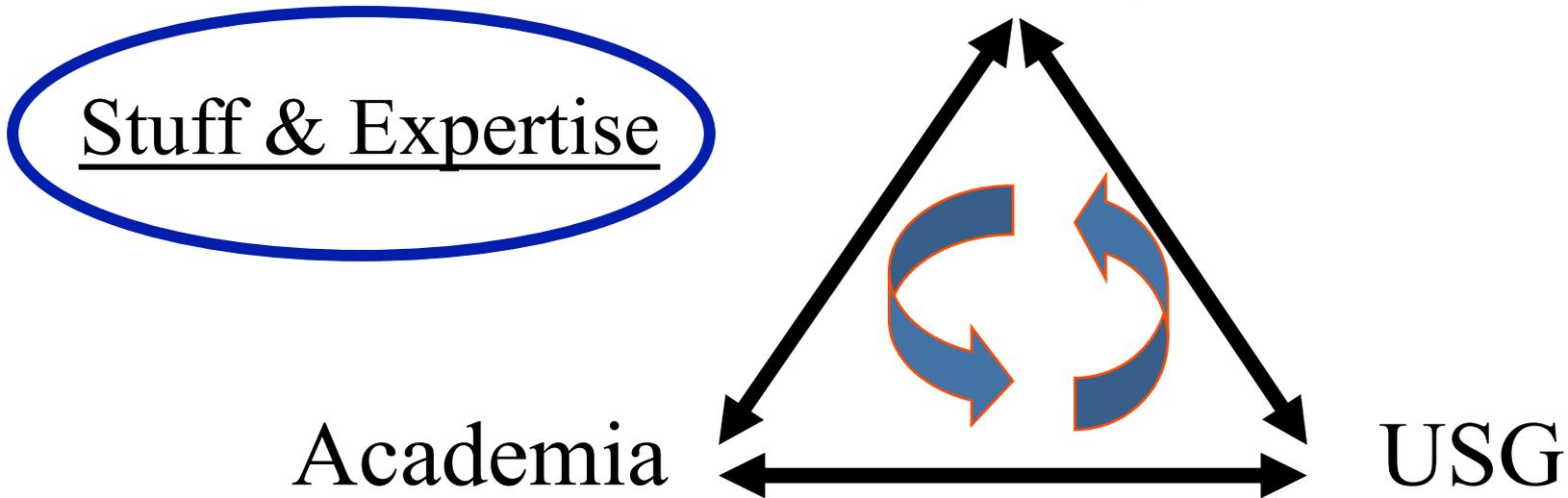
# Highlighting Infrastructure Vulnerabilities

## 2007: Chlorine Release During Railcar Unloading





**We all own this problem!!**



**Solution through collaboration.**